SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Biological Chemistry, Vol. VII., No. 3, issued February 26, contains the following: "The Optical Inactivity of Allantoin," by Lafayette B. Mendel and H. D. Dakin. The generally accepted formula for allantoin contains an asymmetric carbon atom. Yet examination of the substance from a variety of sources showed that it is optically inactive. Evidence is offered indicating that the phenomenon is due to tautomeric change. "The Mechanism of the Oxidation of Glucose by Bromine," by H. H. Bunzel. Experiments are described which support the view that glucose forms two series of salts: the first in which it dissociates into metal and negative glucose ions ($C_6H_{11}O_6^-$); the second, in which it dissociates into positive glucose ions ($C_6H_{13}O_6^+$) and an acid ion. Positive glucose ions are oxidized quantitatively to gluconic acid and an equation is developed showing the velocity of the reaction. "The Purine Metabolism of the Monkey," by H. Gideon Wells. The liver of the monkey resembles that of lower mammals in containing a uricolytic enzyme. The liver also contains xanthine-oxidase; the liver and other viscera contain nuclease, adenase and guanase. "The Effects of Castration on the Metabolism," by Francis H. McCrudden. An experimental study on dogs, the results of which do not confirm the view that castration is followed by a retention of material, especially mineral elements. "Chemical Analysis of Bone from a Case of Human Adolescent Osteomalacia," by Francis H. McCrudden. Bone from osteomalacia contains more magnesium and sulphur, less calcium and phosphoric acid than normal: the increase in the former is far greater than the decrease in the latter. "The Influence of Dietary Alternations on the Types of Intestinal Flora," by C. A. Herter and A. I. Kendall. Extended experiments on monkeys and cats show that an abrupt change from a dominantly protein diet to a dominantly carbohydrate diet is followed by alterations in the intestinal flora, in the putrefaction products in the feces and urine and in the clinical conditions. Degeneration of the proteolyzing bacteria takes place and they are substituted by acidophilic, non-protolyzing bacteria; marked reduction in putrefactive products in feces and urine occurs; a marked improvement in spirits and activity may be noted, indicating a greater sense of bodily and psychical well-being.

HALLEY ON THE AGE OF THE OCEAN

EDMUND HALLEY was a very great man. He was not only the first to predict correctly the return of a comet, that which is now known by his name, but also—before Newton had announced his results to any one—arrived at the conclusion that the attraction of gravitation probably varied inversely as the square of the distance. While these and other important achievements of his are well known, it seems to have been forgotten that Halley devised a method of determining the age of the ocean from chemical denudation. Indeed, I find no mention of Halley in the indices of some of the most authoritative works on geology and geochemistry, while it is evident that neither Mr. T. Mellard Reade[1] nor Mr. J. Joly[2] were aware of a predecessor in this important field. It was almost by accident that I came across Halley's paper read before the Royal Society in 1715, extracts from which are given below.

Halley recognized that the method as he proposed it was almost impracticable, but writing as he did twenty-eight years before Lavoisier's birth, he could hardly have guessed that accurate analyses of river waters, whose solvent action he so clearly describes, would ever become not merely possible but easy. It is very interesting to note that Halley's reasoning is strictly "uniformitarian" while he recognized the tendency involved to a maximum estimate.

Subject to this same limitation (extended to other features besides an original saltness of the sea), Mr. Joly's method of determining the rate at which the accumulation of salt in the ocean takes place from the analysis of

[1] "Chemical Denudation in Relation to Geological Time," 1879.

[2] *Trans. R. S. Dublin*, Vol. 7, 1899, p. 23.

river waters is perhaps the most important means now available for an estimate of the antiquity of the stratified rocks, because it is the simplest and least open to question. To my thinking the fact that his train of reasoning coincided with that of the great astronomer only adds to the credit due Mr. Joly.

A great amount of work has been done of late years on the composition of river waters, much of it incited by Mr. Joly's memoir and undertaken with the purpose of improving the data for such a determination of the age of the ocean. Within a few months it will be practicable to make known the results of a revised estimate founded upon data far more ample than those at the disposition of Mr. Joly eleven years ago. Mr. F. W. Clarke is now engaged in preparing this estimate.

The subjoined extracts from Halley's paper[3] can not but interest all lovers of natural science.

On the Cause of the Saltness of the Ocean, and of the Several Lakes that emit no Rivers; with a Proposal, by means thereof, to discover the Age of the World.

There have been many attempts made, and proposals offered, to ascertain from the appearances of nature, what may have been the antiquity of this globe of earth; on which, by the evidence of sacred writ, mankind has dwelt about 6,000 years; or according to the Septuagint above 7,000. . . . This inquiry seeming to me well to deserve consideration, and worthy the thoughts of the Royal Society, I shall take leave to propose an expedient for determining the age of the world by a medium, as I take it, wholly new, and which in my opinion seems to promise success, though the event can not be judged of till after a long period of time; submitting the same to their better judgment. What suggested this notion was an observation I had made, that all the lakes in the world, properly so called, are found to be salt, some more some less than the ocean, which in the present case may also be esteemed a lake; since by that term I mean such standing waters as perpetually receive rivers running into them, and have no exit or evacuation. . . .

Now I conceive that as all these lakes receive rivers, and have no exit or discharge, so it will be necessary that their waters rise and cover the land, until such time as their surfaces are sufficiently extended, so as to exhale in vapour that water which is poured in by the rivers; and consequently that lakes must be larger or smaller, according to the quantity of the fresh they receive. But the vapours thus exhaled are perfectly fresh; so that the saline particles brought in by the rivers remain behind, while the fresh evaporates; and hence it is evident that the salt in the lakes will be continually augmented, and the water grow salter and salter. . . .

Now if this be the true reason of the saltness of these lakes, it is not improbable but that the Ocean itself is become salt from the same cause, and we are thereby furnished with an argument for estimating the duration of all things, from an observation of the increment of saltness in their waters. For if it be observed what quantity of salt is at present contained in a certain weight of the water, of the Caspian Sea, for example, taken at a certain place, in the driest weather; and after some centuries of years the same weight of water, taken in the same place, and under the same circumstances, be found to contain a sensibly greater quantity of salt than at the time of the first experiment, we may by the rule of proportion, make an estimate of the whole time wherein the water would acquire its present degree of saltness.

And this argument would be the more conclusive, if by a like experiment a similar increase in the saltness of the Ocean should be observed: for that, after the same manner as aforesaid, receives innumerable rivers, all which deposit their saline particles therein; and are again supplied, as I have elsewhere showed, by the vapours of the Ocean, which rise from it in atoms of pure water, without the least admixture of salt. But the rivers in their long passage over the earth imbibe some of its saline particles, though in so small a quantity as not to be perceived, unless in these their depositories after a long tract of time. And if, on repeating the experiment, after another equal number of ages, it shall be found that the saltness is further increased with the same increment as before, then what is now proposed as hypothetical, would appear little less than demonstrative. But since this argument can be of no use to ourselves, it requiring very great intervals of time to come to our conclusion, it were to be wished that the ancient Greek and Latin authors had delivered down to us the degree of the saltness of the sea, as it was about 2000 years ago: for then it can not be doubted but that the difference between what is now found and what then

[3] *Phil. Trans.*, Vol. 29, 1715, p. 296.

was, would become very sensible. I recommend it therefore to the society, as opportunity shall offer, to procure the experiments to be made of the present degree of saltness of the Ocean, and of as many of these lakes as can be come at, that they may stand upon record for the benefit of future ages.

If it be objected that the water of the Ocean, and perhaps of some of these lakes, might at the first beginning of things, in some measure contain salt, so as to disturb the proportionality of the increase of saltness in them, I will not dispute it: but shall observe that such a supposition would by so much contract the age of the world, within the date to be derived from the foregoing argument, which is chiefly intended to refute the ancient notion, some have of late entertained, of the eternity of all things; though perhaps by it the world may be found much older than many have hitherto imagined.

GEORGE F. BECKER

THE NAVAL OBSERVATORY: THE COMPLETION OF THE CATALOGUE OF THE WASHINGTON ZONES OF 1846–52

SHORTLY after the founding of the Naval Observatory, the superintendent, Lieutenant M. F. Maury, U. S. N., in the spring of 1846 directed the observers on the mural circle, the meridian circle and the transit instrument, when these instruments were not otherwise employed, to determine the positions of all the stars culminating above the horizon at Washington and visible with these instruments, beginning at the southern horizon and working northward. In three years 41,700 observations had been made, covering about 30° in declination. No observations seem to have been made during the next two years, but with the installation of the chronograph observing was resumed and 3,200 observations were made during 1851–2. The total number of observations discussed in forming the catalogue is 44,900.

In 1860 was published the first volume of the zones, those observed with the meridian circle in 1846. Shortly thereafter an appropriation was secured from congress for the reduction of the zone observations and Dr. B. A. Gould, of Cambridge, Mass., was secured to take charge of the work. The observations made in 1846–9, except those already published and two books of 3,400 observations which had been mislaid, were copied from the observing books on reduction sheets which were sent to Dr. Gould. The reductions were promptly made and the printer's copy returned. Several years later, 1872–3, the results sent by Dr. Gould were published under the direction of Professor Asaph Hall, U. S. N., in three volumes, as appendices to the Washington observations.

In order to facilitate the cataloguing of these zones, a list of stars to serve as zero stars was selected and added to the observing list of the 8.5-inch transit circle by Professor J. R. Eastman, U. S. N., who also had the individual observations in the four volumes previously mentioned copied on cards. The copying on one card of all the observations of the same star was commenced when work was again stopped.

This was the state of the work in 1901 when cataloguing was undertaken by the writer. A complete rereduction of the observations has not been attempted, but a systematic search has been made for all appreciable errors. In this work have been utilized a manuscript list of 2,200 corrections by Professor J. C. Kapteyn and another of 500 by Dr. F. Ristenpart, and an effort has been made to identify each star observed but once with one in the "Cape Photographic Durchmusterung," the "Cordoba Durchmusterung" or the "Bonn Durchmusterung." All single observations not thus identified are being looked up with one of the equatorials at the observatory.

The 3,400 unpublished observations of 1847–8 and the 3,200 of 1851–2 were reduced under the direction of Professor F. B. Littell, U. S. N., in the same manner as that used in reducing the published results.

The published observations, corrected as a result of the above-mentioned comparisons, together with the unpublished ones, were compared with the positions of the "Cordoba General Catalogue" and zone corrections were determined for each night's work to reduce the Washington observations to the system of the "Cordoba General Catalogue."